

Remarks

Claims 1-18 are pending. The Examiner has entered a restriction requirement as between:

Group I – claims 1, 4, 5 and 6, drawn to an acylphosphine oxide of formula (I) and its process for preparation;

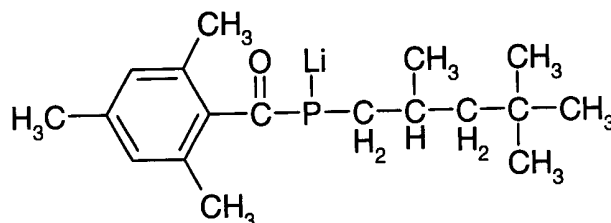
Group II – claims 2, 4, 6, 7 and 8, drawn to an acylphosphine oxide of formula (II);

Group III – claims 3, 4, 9, 10 and 11, drawn to an acylphosphine oxide of formula (III);

Group IV – claims 12-17, drawn to compositions comprising an acylphosphine initiator; and

Group V – claim 18, drawn to a method of use.

Further, the Examiner requires an election of species. Applicants elect to prosecute the invention of Group and direct the Examiner to the compound of Example 2



for the species requirement.

Claims 2 and 3 have been amended to exclude selected compounds by proviso. Applicants are permitted to exclude from their claims that which they were not the first to invent.

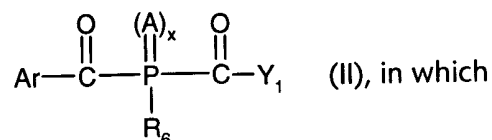
Respectfully submitted,

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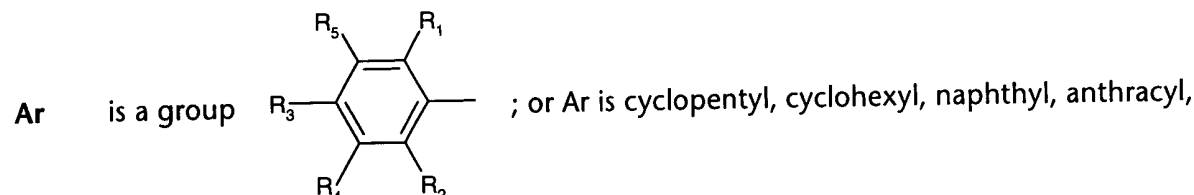
Amended Claims with underlining and bracketing

2. (amended) A compound of the formula II



A is O or S;

x is 0 or 1;



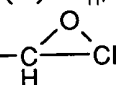
biphenyl or an O-, S- or N-containing 5- or 6-membered heterocyclic ring, where the radicals cyclopentyl, cyclohexyl, naphthyl, anthracyl, biphenyl and 5- or 6-membered heterocyclic ring are unsubstituted or substituted by halogen, C₁-C₄alkyl and/or C₁-C₄alkoxy;

R₁ and R₂ independently of one another are C₁-C₂₀alkyl, OR₁₁, CF₃ or halogen;

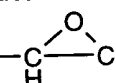
R₃, R₄ and R₅ independently of one another are hydrogen, C₁-C₂₀alkyl, OR₁₁ or halogen;

or in each case two of the radicals R₁, R₂, R₃, R₄ and R₅ together form C₁-C₂₀alkylene which can be interrupted by O, S or -NR₁₄;

R₆ is C₁-C₂₄alkyl, unsubstituted or substituted by C₅-C₂₄cycloalkenyl, phenyl, CN, C(O)R₁₁, C(O)OR₁₁, C(O)N(R₁₄)₂, OC(O)R₁₁, OC(O)OR₁₁, N(R₁₄)C(O)N(R₁₄), OC(O)NR₁₄, N(R₁₄)C(O)OR₁₁, cycloalkyl, halogen,

OR₁₁, SR₁₁, N(R₁₂)(R₁₃) or CH₂;

C₂-C₂₄alkyl which is interrupted once or more than once by nonconsecutive O, S or NR₁₄ and which is unsubstituted or substituted by phenyl, OR₁₁, SR₁₁, N(R₁₂)(R₁₃), CN, C(O)R₁₁, C(O)OR₁₁, C(O)N(R₁₄)₂

and/or CH₂;

C₂-C₂₄alkenyl which is uninterrupted or interrupted once or more than once by nonconsecutive O, S or NR₁₄ and which is unsubstituted or substituted by OR₁₁, SR₁₁ or N(R₁₂)(R₁₃);

C₅-C₂₄cycloalkenyl which is uninterrupted or interrupted once or more than once by nonconsecutive O, S or NR₁₄ and which is unsubstituted or substituted by OR₁₁, SR₁₁ or N(R₁₂)(R₁₃);

C₇-C₂₄arylalkyl which is unsubstituted or substituted on the aryl group by C₁-C₁₂alkyl, C₁-C₁₂alkoxy or halogen;

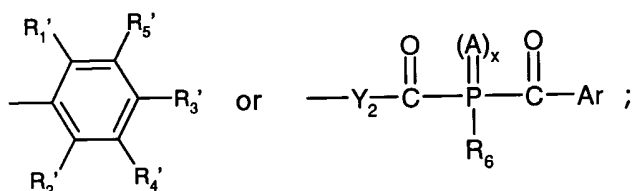
C₄-C₂₄cycloalkyl which is uninterrupted or interrupted once or more than once by O, S and/or NR₁₄ and which is unsubstituted or substituted by OR₁₁, SR₁₁ or N(R₁₂)(R₁₃); or C₈-C₂₄arylalkyl or C₈-C₂₄arylalkenyl;

R₁₁ is H, C₁-C₂₀alkyl, C₂-C₂₀alkenyl, C₃-C₈cycloalkyl, phenyl, benzyl or C₂-C₂₀alkyl which is interrupted once or more than once by nonconsecutive O atoms and which is unsubstituted or substituted by OH and/or SH;

R₁₂ and R₁₃ independently of one another are hydrogen, C₁-C₂₀alkyl, C₃-C₈cycloalkyl, phenyl, benzyl or C₂-C₂₀alkyl which is interrupted once or more than once by O or S and which is unsubstituted or

substituted by OH and/or SH; or R_{12} and R_{13} together are C_3 - C_3 alkylene which is uninterrupted or interrupted by O, S or NR_{14} ;

Y_1 is C_1 - C_{18} alkyl which is unsubstituted or substituted by one or more phenyl; C_1 - C_{18} -halogenoalkyl; C_2 - C_{18} alkyl which is interrupted once or more than once by O or S and which can be substituted by OH and/or SH; unsubstituted C_3 - C_{18} cycloalkyl or C_3 - C_{18} cycloalkyl substituted by C_1 - C_{20} alkyl, OR_{11} , CF_3 or halogen; C_2 - C_{18} alkenyl; or Y_1 is OR_{11} , $N(R_{12})(R_{13})$ or one of the radicals



or Y_1 is cyclopentyl, cyclohexyl, naphthyl, anthracyl, biphenyl or an O-, S- or N-containing 5- or 6-membered heterocyclic ring, where the radicals cyclopentyl, cyclohexyl, naphthyl, anthracyl, biphenyl and 5- or 6-membered heterocyclic ring are unsubstituted or substituted by halogen, C_1 - C_4 alkyl and/or C_1 - C_4 alkoxy;

Y_2 is a direct bond; unsubstituted or phenyl-substituted C_1 - C_{18} alkylene; unsubstituted C_4 - C_{18} cycloalkylene or C_4 - C_{18} cycloalkylene substituted by C_1 - C_{12} alkyl, OR_{11} , halogen and/or phenyl; unsubstituted C_5 - C_{18} cycloalkenylene or C_5 - C_{18} cycloalkenylene substituted by C_1 - C_{12} alkyl, OR_{11} , halogen and/or phenyl; unsubstituted phenylene or phenylene substituted one to four times by C_1 - C_{12} alkyl, OR_{11} , halogen, $-(CO)OR_{14}$, $-(CO)N(R_{12})(R_{13})$ and/or phenyl;

or Y_2 is a radical , where these radicals are unsubstituted

or are substituted one to four times on one or both aromatic ring(s) by C_1 - C_{12} alkyl, OR_{11} , halogen and/or phenyl;

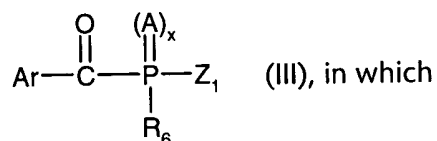
Y_3 is O, S, SO , SO_2 , CH_2 , $C(CH_3)_2$, $CHCH_3$, $C(CF_3)_2$, CO or a direct bond;

R_{14} is hydrogen, phenyl, C_1 - C_{12} alkyl or C_2 - C_{12} alkyl which is interrupted once or more than once by O or S and which can be substituted by OH and/or SH;

R_1' and R_2' independently of one another have the same meanings as given for R_1 and R_2 ; and R_3' , R_4' and R_5' independently of one another have the same meanings as given for R_3 , R_4 and R_5 ; or in each case two of the radicals R_1' , R_2' , R_3' , R_4' and R_5' together form C_1 - C_{20} alkylene which may be interrupted by O, S or NR_{14} ;

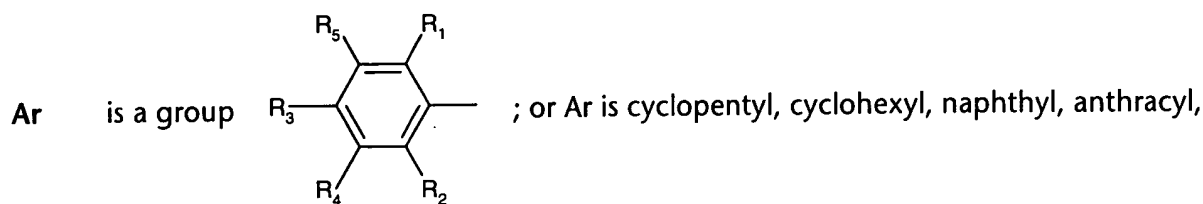
with the proviso that Y_1 is not identical to Ar and wherein the compounds n-butyl-(2,6-dimethoxybenzoyl)-(2,4,6-trimethylbenzoyl) phosphine oxide, i-butyl-(2,6-dimethoxybenzoyl)-(2,4,6-trimethylbenzoyl) phosphine oxide and (2,6-dimethoxybenzoyl)-(2,6-dimethylbenzoyl)-(2,4,4-trimethylpentyl) phosphine oxide are excluded.

3. (amended) A compound of the formula III



A is O or S;

x is 0 or 1;



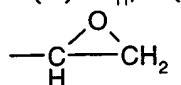
biphenyl or an O-, S- or N-containing 5- or 6-membered heterocyclic ring, where the radicals cyclopentyl, cyclohexyl, naphthyl, anthracyl, biphenyl and 5- or 6-membered heterocyclic ring are unsubstituted or substituted by halogen, C₁-C₄alkyl and/or C₁-C₄alkoxy;

R₁ and R₂ independently of one another are C₁-C₂₀alkyl, OR₁₁, CF₃ or halogen;

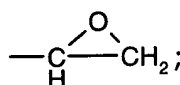
R₃, R₄ and R₅ independently of one another are hydrogen, C₁-C₂₀alkyl, OR₁₁ or halogen;

or in each case two of the radicals R₁, R₂, R₃, R₄ and R₅ together form C₁-C₂₀alkylene which can be interrupted by O, S or -NR₁₄;

R₆ is C₁-C₂₄alkyl, unsubstituted or substituted by C₅-C₂₄cycloalkenyl, phenyl, CN, C(O)R₁₁, C(O)OR₁₁, C(O)N(R₁₄)₂, OC(O)R₁₁, OC(O)OR₁₁, N(R₁₄)C(O)N(R₁₄), OC(O)NR₁₄, N(R₁₄)C(O)OR₁₁, cycloalkyl, halogen,

OR₁₁, SR₁₁, N(R₁₂)(R₁₃) or  ;

C₂-C₂₄alkyl which is interrupted once or more than once by nonconsecutive O, S or NR₁₄ and which is unsubstituted or substituted by phenyl, OR₁₁, SR₁₁, N(R₁₂)(R₁₃), CN, C(O)R₁₁, C(O)OR₁₁, C(O)N(R₁₄)₂

and/or  ;

C₂-C₂₄alkenyl which is uninterrupted or interrupted once or more than once by nonconsecutive O, S or NR₁₄ and which is unsubstituted or substituted by OR₁₁, SR₁₁ or N(R₁₂)(R₁₃);

C₅-C₂₄cycloalkenyl which is uninterrupted or interrupted once or more than once by nonconsecutive O, S or NR₁₄ and which is unsubstituted or substituted by OR₁₁, SR₁₁ or N(R₁₂)(R₁₃);

C₇-C₂₄arylalkyl which is unsubstituted or substituted on the aryl group by C₁-C₁₂alkyl, C₁-C₁₂alkoxy or halogen;

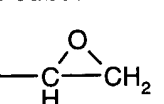
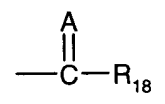
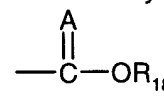
C₄-C₂₄cycloalkyl which is uninterrupted or interrupted once or more than once by O, S and/or NR₁₄ and which is unsubstituted or substituted by OR₁₁, SR₁₁ or N(R₁₂)(R₁₃); or C₈-C₂₄arylalkyl or

C₈-C₂₄arylalkyl;

R₁₁ is H, C₁-C₂₀alkyl, C₂-C₂₀alkenyl, C₃-C₈cycloalkyl, phenyl, benzyl or C₂-C₂₀alkyl which is interrupted once or more than once by nonconsecutive O atoms and which is unsubstituted or substituted by OH and/or SH;

R₁₂ and R₁₃ independently of one another are hydrogen, C₁-C₂₀alkyl, C₃-C₈cycloalkyl, phenyl, benzyl or C₂-C₂₀alkyl, which is interrupted once or more than once by O or S and which is unsubstituted or substituted by OH and/or SH; or R₁₂ and R₁₃ together are C₃-C₃alkylene which is uninterrupted or interrupted by O, S or NR₁₄;

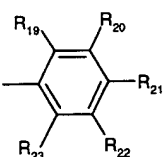
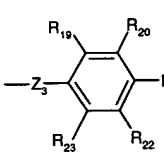
Z₁ is C₁-C₂₄alkyl, which is unsubstituted or substituted once or more than once by OR₁₅, SR₁₅,

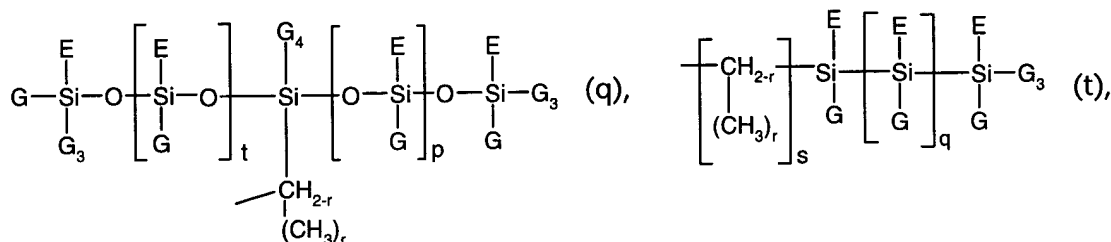
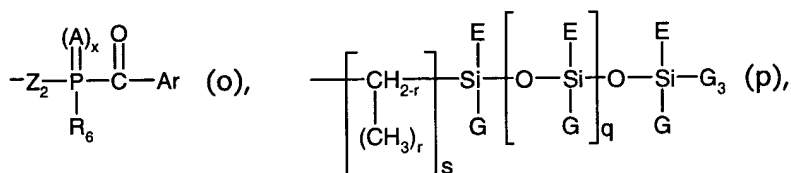
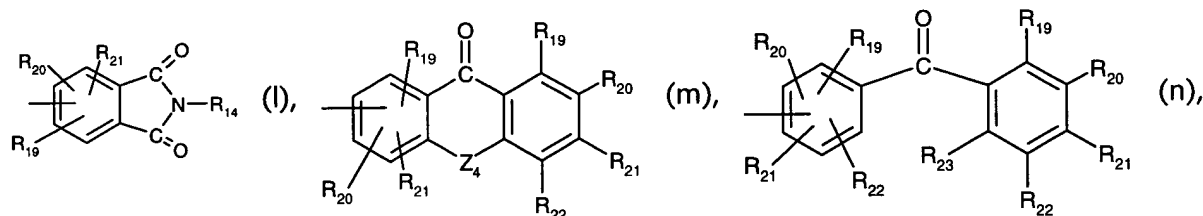
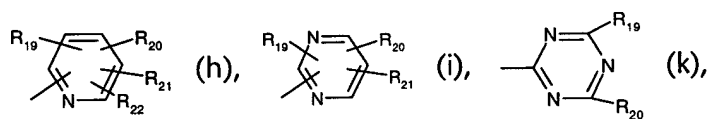
N(R₁₆)(R₁₇), phenyl, halogen, CN, -N=C=A,  ,  , 

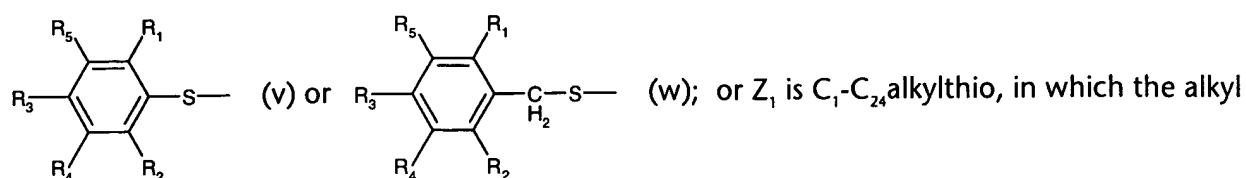
and/or $\text{---}\overset{\overset{\text{A}_1}{\parallel}}{\text{C}}\text{---N(R}_{18})_2$ or Z₁ is C₂-C₂₄alkyl which is interrupted once or more than once by O, S or NR₁₄, and which can be substituted by OR₁₅, SR₁₅, N(R₁₆)(R₁₇), phenyl, halogen, $\text{---}\overset{\overset{\text{O}}{\parallel}}{\text{C}}\text{---CH}_2$,

$\text{---}\overset{\overset{\text{A}}{\parallel}}{\text{C}}\text{---R}_{18}$, $\text{---}\overset{\overset{\text{A}}{\parallel}}{\text{C}}\text{---OR}_{18}$ and/or $\text{---}\overset{\overset{\text{A}_1}{\parallel}}{\text{C}}\text{---N(R}_{18})_2$; or Z₁ is C₁-C₂₄alkoxy, which is substituted once or more than once by phenyl, CN, -N=C=A, $\text{---}\overset{\overset{\text{O}}{\parallel}}{\text{C}}\text{---CH}_2$, $\text{---}\overset{\overset{\text{A}}{\parallel}}{\text{C}}\text{---R}_{18}$, $\text{---}\overset{\overset{\text{A}}{\parallel}}{\text{C}}\text{---OR}_{18}$ and/or

$\text{---}\overset{\overset{\text{A}_1}{\parallel}}{\text{C}}\text{---N(R}_{18})_2$; or Z₁ is $\text{---}\overset{\overset{\text{A}}{\parallel}}{\text{C}}\text{---OR}_{11}$, $\text{---}\overset{\overset{\text{A}_1}{\parallel}}{\text{C}}\text{---N(R}_{16})\text{(R}_{17})}$, $\text{---}\overset{\overset{\text{A}}{\parallel}}{\text{C}}\text{---OR}_{11a}$ or $\text{---}\overset{\overset{\text{A}_1}{\parallel}}{\text{C}}\text{---N(R}_{18a})\text{(R}_{18b})$; or Z₁ is unsubstituted C₃-C₂₄cycloalkyl or C₃-C₂₄cycloalkyl substituted by C₁-C₂₀alkyl, OR₁₁, CF₃ or halogen; unsubstituted C₂-C₂₄alkenyl or C₂-C₂₄alkenyl substituted by C₆-C₁₂aryl, CN, (CO)OR₁₅ or (CO)N(R₁₈)₂; or

Z₁ is C₃-C₂₄cycloalkenyl or is one of the radicals  (f),  (g),



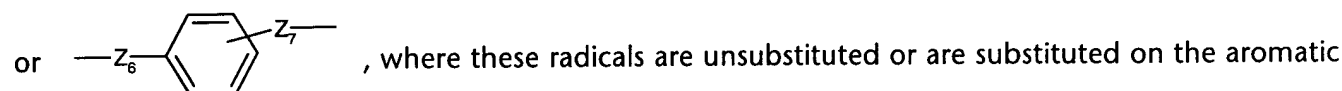
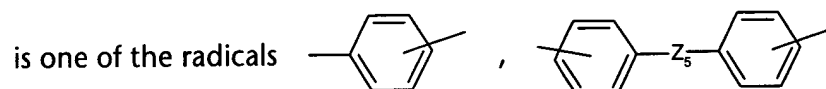


radical is uninterrupted or interrupted once or more than once by nonconsecutive O or S, and is unsubstituted or substituted by OR_{15} , SR_{15} and/or halogen; with the proviso that Z_1 and R_6 are not identical;

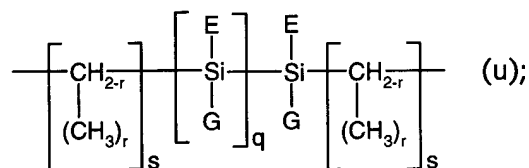
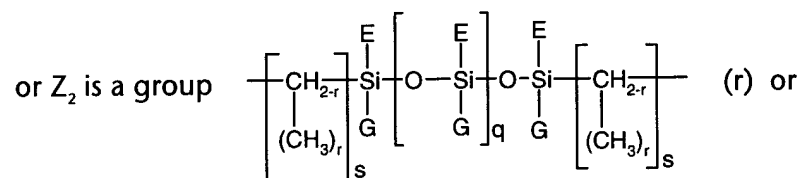
A_1 is O, S or NR_{18a} ;

Z_2 is $C_1\text{-}C_{24}$ alkylene; $C_2\text{-}C_{24}$ alkylene interrupted once or more than once by O, S or NR_{14} ; $C_2\text{-}C_{24}$ alkenylene; $C_2\text{-}C_{24}$ alkenylene interrupted once or more than once by O, S or NR_{14} ; $C_3\text{-}C_{24}$ cycloalkylene; $C_3\text{-}C_{24}$ cycloalkylene interrupted once or more than once by O, S or NR_{14} ; $C_3\text{-}C_{24}$ cycloalkylene; $C_3\text{-}C_{24}$ cycloalkenylene interrupted once or more than once by O, S or NR_{14} ;

where the radicals $C_1\text{-}C_{24}$ alkylene, $C_2\text{-}C_{24}$ alkylene, $C_2\text{-}C_{24}$ alkenylene, $C_3\text{-}C_{24}$ cycloalkylene and $C_3\text{-}C_{24}$ cycloalkenylene are unsubstituted or are substituted by OR_{11} , SR_{11} , $N(R_{12})(R_{13})$ and/or halogen; or Z_2



by $C_1\text{-}C_{20}$ alkyl; $C_2\text{-}C_{20}$ alkyl which is interrupted once or more than once by nonconsecutive O atoms and which is unsubstituted or substituted by OH and/or SH; OR_{11} , SR_{11} , $N(R_{12})(R_{13})$, phenyl, halogen, NO_2 , CN, $(CO)\text{-}OR_{11}$, $(CO)\text{-}R_{11}$, $(CO)\text{-}N(R_{12})(R_{13})$, SO_2R_{24} , OSO_2R_{24} , CF_3 and/or CCl_3 ;



Z_3 is CH_2 , $\text{CH}(\text{OH})$, $\text{CH}(\text{CH}_3)$ or $\text{C}(\text{CH}_3)_2$;

Z_4 is S, O, CH_2 , $\text{C}=\text{O}$, NR_{14} or a direct bond;

Z_5 is S, O, CH_2 , CHCH_3 , $\text{C}(\text{CH}_3)_2$, $\text{C}(\text{CF}_3)_2$, SO, SO_2 , CO;

Z_6 and Z_7 independently of one another are CH_2 , CHCH_3 or $\text{C}(\text{CH}_3)_2$;

r is 0, 1 or 2;

s is a number from 1 to 12;

q is a number from 0 to 50;

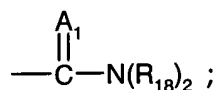
t and p are each a number from 0 to 20;

E, G, G₃ and G₄ independently of one another are unsubstituted C₁-C₁₂alkyl or C₁-C₁₂alkyl substituted by halogen, or are unsubstituted phenyl or phenyl substituted by one or more C₁-C₄alkyl; or are C₂-C₁₂alkenyl;

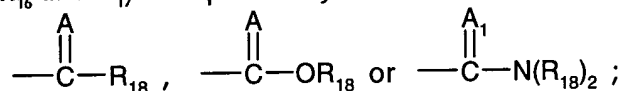
R_{11a} is C₁-C₂₀alkyl substituted once or more than once by OR₁₅ or $\text{---}\overset{\text{O}}{\underset{\text{H}}{\text{C}}}\text{---CH}_2$; or is C₂-C₂₀alkyl which is interrupted once or more than once by nonconsecutive O atoms and is unsubstituted or substituted once or more than once by OR₁₅, halogen or $\text{---}\overset{\text{O}}{\underset{\text{H}}{\text{C}}}\text{---CH}_2$; or R_{11a} is C₂-C₂₀alkenyl, C₃-C₁₂alkynyl; or R_{11a} is C₃-C₁₂cycloalkenyl which is substituted once or more than once by halogen, NO₂, C₁-C₆alkyl, OR₁₁ or C(O)OR₁₈; or C₇-C₁₆arylalkyl or C₈-C₁₆arylalkyl;

R₁₄ is hydrogen, phenyl, C₁-C₁₂alkoxy, C₁-C₁₂alkyl or C₂-C₁₂alkyl which is interrupted once or more than once by O or S and which is unsubstituted or substituted by OH and/or SH;

R₁₅ has one of the meanings given for R₁₁ or is a radical $\text{---}\overset{\text{A}}{\underset{\text{H}}{\text{C}}}\text{---R}_{18}$, $\text{---}\overset{\text{A}}{\underset{\text{H}}{\text{C}}}\text{---OR}_{18}$ or



R₁₆ and R₁₇ independently of one another have one of the meanings given for R₁₂ or are a radical

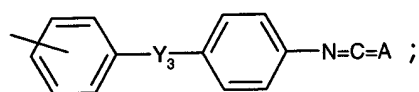


R₁₈ is hydrogen, C₁-C₂₄alkyl, C₂-C₁₂alkenyl, C₃-C₈cycloalkyl, phenyl, benzyl; C₂-C₂₀alkyl which is interrupted once or more than once by O or S and which is unsubstituted or substituted by OH;

R_{18a} and R_{18b} independently of one another are hydrogen; C₁-C₂₀alkyl, which is substituted once or more than once by OR₁₅, halogen, styryl, methylstyryl, -N=C=A or $\text{---}\overset{\text{O}}{\underset{\text{H}}{\text{C}}}\text{---CH}_2$; or C₂-C₂₀alkyl, which is interrupted once or more than once by nonconsecutive O atoms and which is unsubstituted or substituted once or more than once by OR₁₅, halogen, styryl, methylstyryl or $\text{---}\overset{\text{O}}{\underset{\text{H}}{\text{C}}}\text{---CH}_2$; or R_{18a} and

R_{18b} are C₂-C₁₂alkenyl; C₃-C₁₂cycloalkyl, which is substituted by -N=C=A or -CH₂-N=C=A and is additionally unsubstituted or substituted by one or more C₁-C₄alkyl; or R_{18a} and R_{18b} are C₆-C₁₂aryl, unsubstituted or substituted once or more than once by halogen, NO₂, C₁-C₆alkyl, C₂-C₄alkenyl, OR₁₁, -N=C=A, -CH₂-N=C=A or C(O)OR₁₈; or R_{18a} and R_{18b} are C₇-C₁₆arylalkyl; or R_{18a} and R_{18b} together are C₈-

C₁₆arylalkyl; or R_{18a} and R_{18b} independently of one another are



Y₃ is O, S, SO, SO₂, CH₂, C(CH₃)₂, CHCH₃, C(CF₃)₂, (CO), or a direct bond;

R₁₉, R₂₀, R₂₁, R₂₂ and R₂₃ independently of one another are hydrogen, C₁-C₂₀alkyl; C₂-C₂₀alkyl, which is interrupted once or more than once by nonconsecutive O atoms and which is unsubstituted or substituted by OH and/or SH; or R₁₉, R₂₀, R₂₁, R₂₂ and R₂₃ are OR₁₁, SR₁₁, N(R₁₂)(R₁₃), NO₂, CN, SO₂R₂₄,

OSO₂R₂₄, CF₃, CCl₃, halogen; or phenyl which is unsubstituted or substituted once or more than once by C₁-C₄alkyl or C₁-C₄alkoxy;

or in each case two of the radicals R₁₉, R₂₀, R₂₁, R₂₂ and R₂₃ together form C₁-C₂₀alkylene which is uninterrupted or interrupted by O, S or -NR₁₄;

R₂₄ is C₁-C₁₂alkyl, halogen-substituted C₁-C₁₂alkyl, phenyl, or phenyl substituted by OR₁₁ and/or SR₁₁; with the proviso that R₆ and Z₁ are not identical and wherein the compounds benzyl-n-butyl-(2,6-dimethoxybenzoyl) phosphine oxide and benzyl-n-butyl-(2,4,6-trimethylbenzoyl) phosphine oxide are excluded.